SEQUENCE LISTING

<110> TOYO BOSEKI KABUSHIKI KAISHA

<120> MODIFIED THERMOSTABLE DNA POLYMERASE

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cctggattgt tctacaagat tatgggggat gaaag atg atc ctc gac act gac 173

Met Ile Leu Asp Thr Asp
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tac ata acc gag gat gga aag cct gtc ata aga att ttc aag aag gaa 221
Tyr Ile Thr Glu Asp Gly Lys Pro Val Ile Arg Ile Phe Lys Lys Glu
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aac ggc gag ttt aag att gag tac gac cgg act ttt gaa ccc tac ttc 269
Asn Gly Glu Phe Lys Ile Glu Tyr Asp Arg Thr Phe Glu Pro Tyr Phe
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tac gcc ctc ctg aag gac gat tct gcc att gag gaa gtc aag aag ata 317
Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile Glu Glu Val Lys Lys Ile
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acc gcc gag agg cac ggg acg gtt gta acg gtt aag cgg gtt gaa aag 365
Thr Ala Glu Arg His Gly Thr Val Val Thr Val Lys Arg Val Glu Lys
55 60 65 70

gtt cag aag aag ttc ctc ggg aga cca gtt gag gtc tgg aaa ctc tac 413
Val Gln Lys Lys Phe Leu Gly Arg Pro Val Glu Val Trp Lys Leu Tyr
75 80 85

ttt act cat ccg cag gac gtc cca gcg ata agg gac aag ata cga gag 461
Phe Thr His Pro Gln Asp Val Pro Ala Ile Arg Asp Lys Ile Arg Glu

90 95 100

cat ggg gca gtt att gac atc tac gag tac gac ata ccc ttc gcc aag 509
His Gly Ala Val Ile Asp Ile Tyr Glu Tyr Asp Ile Pro Phe Ala Lys
105 110 115

cgc tac ctc ata gac aag gga tta gtg cca atg gaa ggc gac gag gag 557
Arg Tyr Leu Ile Asp Lys Gly Leu Val Pro Met Glu Gly Asp Glu Glu
120 125 130

ctg aaa atg ctc gcc ttc gac att gaa act ctc tac cat gag ggc gag 605
Leu Lys Met Leu Ala Phe Asp Ile Glu Thr Leu Tyr His Glu Gly Glu
135 140 145 150

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Glu Phe Ala Glu Gly Pro Ile Leu Met Ile Ser Tyr Ala Asp Glu Glu
155 160 165

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Gly Ala Arg Val Ile Thr Trp Lys Asn Val Asp Leu Pro Tyr Val Asp
170 175 180

gtc gtc tcg acg gag agg gag atg ata aag cgc ttc ctc cgt gtt gtg 749
Val Val Ser Thr Glu Arg Glu Met Ile Lys Arg Phe Leu Arg Val Val
185 190 195

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Lys Glu Lys Asp Pro Asp Val Leu Ile Thr Tyr Asn Gly Asp Asn Phe
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Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu Lys Leu Gly Ile Asn Phe
215                 220                 225                 230

gcc ctc gga agg gat gga agc gag ccg aag att cag agg atg ggc gac   893
Ala Leu Gly Arg Asp Gly Ser Glu Pro Lys Ile Gln Arg Met Gly Asp
                235                 240                 245

agg ttt gcc gtc gaa gtg aag gga cgg ata cac ttc gat ctc tat cct   941
Arg Phe Ala Val Glu Val Lys Gly Arg Ile His Phe Asp Leu Tyr Pro
            250                 255                 260

gtg ata aga cgg acg ata aac ctg ccc aca tac acg ctt gag gcc gtt   989
Val Ile Arg Arg Thr Ile Asn Leu Pro Thr Tyr Thr Leu Glu Ala Val
        265                 270                 275

tat gaa gcc gtc ttc ggt cag ccg aag gag aag gtt tac gct gag gaa  1037
Tyr Glu Ala Val Phe Gly Gln Pro Lys Glu Lys Val Tyr Ala Glu Glu
    280                 285                 290
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ata acc aca gcc tgg gaa acc ggc gag aac ctt gag aga gtc gcc cgc   1085
Ile Thr Thr Ala Trp Glu Thr Gly Glu Asn Leu Glu Arg Val Ala Arg
295                 300                 305                 310

tac tcg atg gaa gat gcg aag gtc aca tac gag ctt ggg aag gag ttc   1133
Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr Glu Leu Gly Lys Glu Phe
                315                 320                 325

ctt ccg atg gag gcc cag ctt tct cgc tta atc ggc cag tcc ctc tgg   1181
Leu Pro Met Glu Ala Gln Leu Ser Arg Leu Ile Gly Gln Ser Leu Trp
            330                 335                 340

gac gtc tcc cgc tcc agc act ggc aac ctc gtt gag tgg ttc ctc ctc   1229
Asp Val Ser Arg Ser Ser Thr Gly Asn Leu Val Glu Trp Phe Leu Leu
        345                 350                 355

agg aag gcc tat gag agg aat gag ctg gcc ccg aac aag ccc gat gaa   1277
Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala Pro Asn Lys Pro Asp Glu
    360                 365                 370

aag gag ctg gcc aga aga cgg cag agc tat gaa gga ggc tat gta aaa   1325
Lys Glu Leu Ala Arg Arg Arg Gln Ser Tyr Glu Gly Gly Tyr Val Lys
375                 380                 385                 390

gag ccc gag aga ggg ttg tgg gag aac ata gtg tac cta gat ttt aga   1373
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Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile Val Tyr Leu Asp Phe Arg
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tgc cat cca gcc gat acg aag gtt gtc gtc aag ggg aag ggg att ata 1421
Cys His Pro Ala Asp Thr Lys Val Val Val Lys Gly Lys Gly Ile Ile
410 415 420

aac atc agc gag gtt cag gaa ggt gac tat gtc ctt ggg att gac ggc 1469
Asn Ile Ser Glu Val Gln Glu Gly Asp Tyr Val Leu Gly Ile Asp Gly
425 430 435

tgg cag aga gtt aga aaa gta tgg gaa tac gac tac aaa ggg gag ctt 1517
Trp Gln Arg Val Arg Lys Val Trp Glu Tyr Asp Tyr Lys Gly Glu Leu
440 445 450

gta aac ata aac ggg tta aag tgt acg ccc aat cat aag ctt ccc gtt 1565
Val Asn Ile Asn Gly Leu Lys Cys Thr Pro Asn His Lys Leu Pro Val
455 460 465 470

gtt aca aag aac gaa cga caa acg aga ata aga gac agt ctt gct aag 1613
Val Thr Lys Asn Glu Arg Gln Thr Arg Ile Arg Asp Ser Leu Ala Lys
475 480 485

tct ttc ctt act aaa aaa gtt aag ggc aag ata ata acc act ccc ctt 1661
Ser Phe Leu Thr Lys Lys Val Lys Gly Lys Ile Ile Thr Thr Pro Leu

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                490                 495                 500

ttc tat gaa ata ggc aga gcg aca agt gag aat att cca gaa gaa gag   1709
Phe Tyr Glu Ile Gly Arg Ala Thr Ser Glu Asn Ile Pro Glu Glu Glu
        505                 510                 515

gtt ctc aag gga gag ctc gct ggc ata cta ttg gct gaa gga acg ctc   1757
Val Leu Lys Gly Glu Leu Ala Gly Ile Leu Leu Ala Glu Gly Thr Leu
    520                 525                 530

ttg agg aaa gac gtt gaa tac ttt gat tca tcc cgc aaa aaa cgg agg   1805
Leu Arg Lys Asp Val Glu Tyr Phe Asp Ser Ser Arg Lys Lys Arg Arg
535                 540                 545                 550

att tca cac cag tat cgt gtt gag ata acc att ggg aaa gac gag gag   1853
Ile Ser His Gln Tyr Arg Val Glu Ile Thr Ile Gly Lys Asp Glu Glu
                555                 560                 565

gag ttt agg gat cgt atc aca tac att ttt gag cgt ttg ttt ggg att   1901
Glu Phe Arg Asp Arg Ile Thr Tyr Ile Phe Glu Arg Leu Phe Gly Ile
            570                 575                 580

act cca agc atc tcg gag aag aaa gga act aac gca gta aca ctc aaa   1949
Thr Pro Ser Ile Ser Glu Lys Lys Gly Thr Asn Ala Val Thr Leu Lys
        585                 590                 595
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gtt gcg aag aag aat gtt tat ctt aaa gtc aag gaa att atg gac aac   1997
Val Ala Lys Lys Asn Val Tyr Leu Lys Val Lys Glu Ile Met Asp Asn
    600                 605                 610

ata gag tcc cta cat gcc ccc tcg gtt ctc agg gga ttc ttc gaa ggc   2045
Ile Glu Ser Leu His Ala Pro Ser Val Leu Arg Gly Phe Phe Glu Gly
615                 620                 625                 630

gac ggt tca gta aac agg gtt agg agg agt att gtt gca acc cag ggt   2093
Asp Gly Ser Val Asn Arg Val Arg Arg Ser Ile Val Ala Thr Gln Gly
                635                 640                 645

aca aag aac gag tgg aag att aaa ctg gtg tca aaa ctg ctc tcc cag   2141
Thr Lys Asn Glu Trp Lys Ile Lys Leu Val Ser Lys Leu Leu Ser Gln
            650                 655                 660

ctt ggt atc cct cat caa acg tac acg tat cag tat cag gaa aat ggg   2189
Leu Gly Ile Pro His Gln Thr Tyr Thr Tyr Gln Tyr Gln Glu Asn Gly
        665                 670                 675

aaa gat cgg agc agg tat ata ctg gag ata act gga aag gac gga ttg   2237
Lys Asp Arg Ser Arg Tyr Ile Leu Glu Ile Thr Gly Lys Asp Gly Leu
    680                 685                 690
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ata ctg ttc caa aca ctc att gga ttc atc agt gaa aga aag aac gct   2285
Ile Leu Phe Gln Thr Leu Ile Gly Phe Ile Ser Glu Arg Lys Asn Ala
695                 700                 705                 710

ctg ctt aat aag gca ata tct cag agg gaa atg aac aac ttg gaa aac   2333
Leu Leu Asn Lys Ala Ile Ser Gln Arg Glu Met Asn Asn Leu Glu Asn
                715                 720                 725

aat gga ttt tac agg ctc agt gaa ttc aat gtc agc acg gaa tac tat   2381
Asn Gly Phe Tyr Arg Leu Ser Glu Phe Asn Val Ser Thr Glu Tyr Tyr
            730                 735                 740

gag ggc aag gtc tat gac tta act ctt gaa gga act ccc tac tac ttt   2429
Glu Gly Lys Val Tyr Asp Leu Thr Leu Glu Gly Thr Pro Tyr Tyr Phe
        745                 750                 755

gcc aat ggc ata ttg acc cat aac tcc ctg tac ccc tca atc atc atc   2477
Ala Asn Gly Ile Leu Thr His Asn Ser Leu Tyr Pro Ser Ile Ile Ile
    760                 765                 770

acc cac aac gtc tcg ccg gat acg ctc aac aga gaa gga tgc aag gaa   2525
Thr His Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Lys Glu
775                 780                 785                 790

tat gac gtt gcc cca cag gtc ggc cac cgc ttc tgc aag gac ttc cca   2573
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Tyr Asp Val Ala Pro Gln Val Gly His Arg Phe Cys Lys Asp Phe Pro
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gga ttt atc ccg agc ctg ctt gga gac ctc cta gag gag agg cag aag  2621
Gly Phe Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys
            810                 815                 820

ata aag aag aag atg aag gcc acg att gac ccg atc gag agg aag ctc  2669
Ile Lys Lys Lys Met Lys Ala Thr Ile Asp Pro Ile Glu Arg Lys Leu
        825                 830                 835

ctc gat tac agg cag agg gcc atc aag atc ctg gca aac agc atc cta  2717
Leu Asp Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Ile Leu
    840                 845                 850

ccc gag gaa tgg ctt cca gtc ctc gag gaa ggg gag gtt cac ttc gtc  2765
Pro Glu Glu Trp Leu Pro Val Leu Glu Glu Gly Glu Val His Phe Val
855                 860                 865                 870

agg att gga gag ctc ata gac cgg atg atg gag gaa aat gct ggg aaa  2813
Arg Ile Gly Glu Leu Ile Asp Arg Met Met Glu Glu Asn Ala Gly Lys
                875                 880                 885

gta aag aga gag ggc gag acg gaa gtg ctt gag gtc agt ggg ctt gaa  2861
Val Lys Arg Glu Gly Glu Thr Glu Val Leu Glu Val Ser Gly Leu Glu
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gtc ccg tcc ttt aac agg aga act aac aag gcc gag ctc aag aga gta 2909
Val Pro Ser Phe Asn Arg Arg Thr Asn Lys Ala Glu Leu Lys Arg Val
905 910 915

aag gcc ctg att agg cac gat tat tct ggc aag gtc tac acc atc aga 2957
Lys Ala Leu Ile Arg His Asp Tyr Ser Gly Lys Val Tyr Thr Ile Arg
920 925 930

ctg aag tcg ggg agg aga ata aag ata acc tct ggc cac agc ctc ttc 3005
Leu Lys Ser Gly Arg Arg Ile Lys Ile Thr Ser Gly His Ser Leu Phe
935 940 945 950

tct gtg aga aac ggg gag ctc gtt gaa gtt acg ggc gat gaa cta aag 3053
Ser Val Arg Asn Gly Glu Leu Val Glu Val Thr Gly Asp Glu Leu Lys
955 960 965

cca ggt gac ctc gtt gca gtc ccg cgg aga ttg gag ctt cct gag aga 3101
Pro Gly Asp Leu Val Ala Val Pro Arg Arg Leu Glu Leu Pro Glu Arg
970 975 980

aac cac gtg ctg aac ctc gtt gaa ctg ctc ctt gga acg cca gaa gaa 3149
Asn His Val Leu Asn Leu Val Glu Leu Leu Leu Gly Thr Pro Glu Glu
985 990 995

gaa act ttg gac atc gtc atg acg atc cca gtc aag ggt aag aag aac 3197
Glu Thr Leu Asp Ile Val Met Thr Ile Pro Val Lys Gly Lys Lys Asn
1000 1005 1010

ttc ttt aaa ggg atg ctc agg act ttg cgc tgg att ttc gga gag gaa 3245
Phe Phe Lys Gly Met Leu Arg Thr Leu Arg Trp Ile Phe Gly Glu Glu
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Lys Arg Pro Arg Thr Ala Arg Arg Tyr Leu Arg His Leu Glu Asp Leu
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ggc tat gtc cgg ctt aag aag atc ggc tac gaa gtc ctc gac tgg gac 3341
Gly Tyr Val Arg Leu Lys Lys Ile Gly Tyr Glu Val Leu Asp Trp Asp
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Ser Leu Lys Asn Tyr Arg Arg Leu Tyr Glu Ala Leu Val Glu Asn Val
1065 1070 1075

aga tac aac ggc aac aag agg gag tac ctc gtt gaa ttc aat tcc atc 3437
Arg Tyr Asn Gly Asn Lys Arg Glu Tyr Leu Val Glu Phe Asn Ser Ile
1080 1085 1090

cgg gat gca gtt ggc ata atg ccc cta aaa gag ctg aag gag tgg aag 3485
Arg Asp Ala Val Gly Ile Met Pro Leu Lys Glu Leu Lys Glu Trp Lys
1095 1100 1105 1110

atc ggc acg ctg aac ggc ttc aga atg aga aag ctc att gaa gtg gac 3533
Ile Gly Thr Leu Asn Gly Phe Arg Met Arg Lys Leu Ile Glu Val Asp
1115 1120 1125

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Glu Ser Leu Ala Lys Leu Leu Gly Tyr Tyr Val Ser Glu Gly Tyr Ala
1130 1135 1140

aga aag cag agg aat ccc aaa aac ggc tgg agc tac agc gtg aag ctc 3629
Arg Lys Gln Arg Asn Pro Lys Asn Gly Trp Ser Tyr Ser Val Lys Leu
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tac aac gaa gac cct gaa gtg ctg gac gat atg gag aga ctc gcc agc 3677
Tyr Asn Glu Asp Pro Glu Val Leu Asp Asp Met Glu Arg Leu Ala Ser
1160 1165 1170

agg ttt ttc ggg aag gtg agg cgg ggc agg aac tac gtt gag ata ccg 3725
Arg Phe Phe Gly Lys Val Arg Arg Gly Arg Asn Tyr Val Glu Ile Pro
1175 1180 1185 1190

aag aag atc ggc tac ctg ctc ttt gag aac atg tgc ggt gtc cta gcg 3773

Lys Lys Ile Gly Tyr Leu Leu Phe Glu Asn Met Cys Gly Val Leu Ala
1195 1200 1205

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Glu Asn Lys Arg Ile Pro Glu Phe Val Phe Thr Ser Pro Lys Gly Val
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cgg ctg gcc ttc ctt gag ggg tac tca tcg gcg atg gcg acg tcc acc 3869
Arg Leu Ala Phe Leu Glu Gly Tyr Ser Ser Ala Met Ala Thr Ser Thr
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gaa caa gag act cag gct ctc aac gaa aag cga gct tta gcg aac cag 3917
Glu Gln Glu Thr Gln Ala Leu Asn Glu Lys Arg Ala Leu Ala Asn Gln
1240 1245 1250

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Leu Val Leu Leu Leu Asn Ser Val Gly Val Ser Ala Val Lys Leu Gly
1255 1260 1265 1270

cac gac agc ggc gtt tac agg gtc tat ata aac gag gag ctc ccg ttc 4013
His Asp Ser Gly Val Tyr Arg Val Tyr Ile Asn Glu Glu Leu Pro Phe
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Val Lys Leu Asp Lys Lys Lys Asn Ala Tyr Tyr Ser His Val Ile Pro

1290 1295 1300

aag gaa gtc ctg agc gag gtc ttt ggg aag gtt ttc cag aaa aac gtc 4109
Lys Glu Val Leu Ser Glu Val Phe Gly Lys Val Phe Gln Lys Asn Val
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Ser Pro Gln Thr Phe Arg Lys Met Val Glu Asp Gly Arg Leu Asp Pro
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gaa aag gcc cag agg ctc tcc tgg ctc att gag ggg gac gta gtg ctc 4205
Glu Lys Ala Gln Arg Leu Ser Trp Leu Ile Glu Gly Asp Val Val Leu
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gac cgc gtt gag tcc gtt gat gtg gaa gac tac gat ggt tat gtc tat 4253
Asp Arg Val Glu Ser Val Asp Val Glu Asp Tyr Asp Gly Tyr Val Tyr
1355 1360 1365

gac ctg agc gtc gag gac aac gag aac ttc ctc gtt ggc ttt ggg ttg 4301
Asp Leu Ser Val Glu Asp Asn Glu Asn Phe Leu Val Gly Phe Gly Leu
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Val Tyr Ala His Asn Ser Tyr Tyr Gly Tyr Tyr Gly Tyr Ala Arg Ala
1385 1390 1395

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gag tac ata acg atg acc atc aag gag ata gag gaa aag tac ggc ttt   4445
Glu Tyr Ile Thr Met Thr Ile Lys Glu Ile Glu Glu Lys Tyr Gly Phe
1415                1420                1425                1430

aag gta atc tac agc gac acc gac gga ttt ttt gcc aca ata cct gga   4493
Lys Val Ile Tyr Ser Asp Thr Asp Gly Phe Phe Ala Thr Ile Pro Gly
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gcc gat gct gaa acc gtc aaa aag aag gct atg gag ttc ctc aag tat   4541
Ala Asp Ala Glu Thr Val Lys Lys Lys Ala Met Glu Phe Leu Lys Tyr
          1450                1455                1460

atc aac gcc aaa ctt ccg ggc gcg ctt gag ctc gag tac gag ggc ttc   4589
Ile Asn Ala Lys Leu Pro Gly Ala Leu Glu Leu Glu Tyr Glu Gly Phe
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Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys Lys Tyr Ala Val Ile Asp
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tgg agc gag ata gcg aaa gag acg cag gcg agg gtt ctt gaa gct ttg 4733
Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala Arg Val Leu Glu Ala Leu
1515 1520 1525

cta aag gac ggt gac gtc gag aag gcc gtg agg ata gtc aaa gaa gtt 4781
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Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro Pro Glu Lys Leu Val Ile
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His Glu Gln Ile Thr Arg Asp Leu Lys Asp Tyr Lys Ala Thr Gly Pro
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cac gtt gcc gtt gcc aag agg ttg gcc gcg aga gga gtc aaa ata cgc 4925
His Val Ala Val Ala Lys Arg Leu Ala Ala Arg Gly Val Lys Ile Arg
1575 1580 1585 1590

cct gga acg gtg ata agc tac atc gtg ctc aag ggc tct ggg agg ata 4973

Pro Gly Thr Val Ile Ser Tyr Ile Val Leu Lys Gly Ser Gly Arg Ile
1595 1600 1605

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Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe Asp Pro Thr Lys His Lys
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tac gac gcc gag tac tac att gag aac cag gtt ctc cca gcc gtt gag 5069
Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln Val Leu Pro Ala Val Glu
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aga att ctg aga gcc ttc ggt tac cgc aag gaa gac ctg cgc tac cag 5117
Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys Glu Asp Leu Arg Tyr Gln
1640 1645 1650

aag acg aga cag gtt ggt ttg agt gct tgg ctg aag ccg aag gga act 5165
Lys Thr Arg Gln Val Gly Leu Ser Ala Trp Leu Lys Pro Lys Gly Thr
1655 1660 1665 1670

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20 25 30

Thr Phe Glu Pro Tyr Phe Tyr Ala Leu Leu Lys Asp Asp Ser Ala Ile
35 40 45

Glu Glu Val Lys Lys Ile Thr Ala Glu Arg His Gly Thr Val Val Thr
50 55 60

Val Lys Arg Val Glu Lys Val Gln Lys Lys Phe Leu Gly Arg Pro Val
65 70 75 80

Glu Val Trp Lys Leu Tyr Phe Thr His Pro Gln Asp Val Pro Ala Ile
85 90 95

Arg Asp Lys Ile Arg Glu His Pro Ala Val Ile Asp Ile Tyr Glu Tyr
100 105 110

Asp Ile Pro Phe Ala Lys Arg Tyr Leu Ile Asp Lys Gly Leu Val Pro
115 120 125

Met Glu Gly Asp Glu Glu Leu Lys Met Leu Ala Phe Asp Ile Glu Thr
130 135 140

Leu Tyr His Glu Gly Glu Glu Phe Ala Glu Gly Pro Ile Leu Met Ile
145 150 155 160

Ser Tyr Ala Asp Glu Glu Gly Ala Arg Val Ile Thr Trp Lys Asn Val
165 170 175

Asp Leu Pro Tyr Val Asp Val Val Ser Thr Glu Arg Glu Met Ile Lys
180 185 190

Arg Phe Leu Arg Val Val Lys Glu Lys Asp Pro Asp Val Leu Ile Thr
195 200 205

Tyr Asn Gly Asp Asn Phe Asp Phe Ala Tyr Leu Lys Lys Arg Cys Glu
210 215 220

Lys Leu Gly Ile Asn Phe Ala Leu Gly Arg Asp Gly Ser Glu Pro Lys

225 230 235 240

Ile Gln Arg Met Gly Asp Arg Phe Ala Val Glu Val Lys Gly Arg Ile
245 250 255

His Phe Asp Leu Tyr Pro Val Ile Arg Arg Thr Ile Asn Leu Pro Thr
260 265 270

Tyr Thr Leu Glu Ala Val Tyr Glu Ala Val Phe Gly Gln Pro Lys Glu
275 280 285

Lys Val Tyr Ala Glu Glu Ile Thr Thr Ala Trp Glu Thr Gly Glu Asn
290 295 300

Leu Glu Arg Val Ala Arg Tyr Ser Met Glu Asp Ala Lys Val Thr Tyr
305 310 315 320

Glu Leu Gly Lys Glu Phe Leu Pro Met Glu Ala Gln Leu Ser Arg Leu
325 330 335

Ile Gly Gln Ser Leu Trp Asp Val Ser Arg Ser Ser Thr Gly Asn Leu
340 345 350

Val Glu Trp Phe Leu Leu Arg Lys Ala Tyr Glu Arg Asn Glu Leu Ala
355 360 365

Pro Asn Lys Pro Asp Glu Lys Glu Leu Ala Arg Arg Arg Gln Ser Tyr
370 375 380

Glu Gly Gly Tyr Val Lys Glu Pro Glu Arg Gly Leu Trp Glu Asn Ile
385 390 395 400

Val Tyr Leu Asp Phe Arg Ser Leu Tyr Pro Ser Ile Ile Ile Thr His
405 410 415

Asn Val Ser Pro Asp Thr Leu Asn Arg Glu Gly Cys Lys Glu Tyr Asp
420 425 430

Val Ala Pro Gln Val Gly His Arg Phe Cys Lys Asp Phe Pro Gly Phe
435 440 445

Ile Pro Ser Leu Leu Gly Asp Leu Leu Glu Glu Arg Gln Lys Ile Lys
450 455 460

Lys Lys Met Lys Ala Thr Ile Asp Pro Ile Glu Arg Lys Leu Leu Asp
465 470 475 480

Tyr Arg Gln Arg Ala Ile Lys Ile Leu Ala Asn Ser Tyr Tyr Gly Tyr
485 490 495

Tyr Gly Tyr Ala Arg Ala Arg Trp Tyr Cys Lys Glu Cys Ala Glu Ser
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Val Thr Ala Trp Gly Arg Glu Tyr Ile Thr Met Thr Ile Lys Glu Ile
515 520 525

Glu Glu Lys Tyr Gly Phe Lys Val Ile Tyr Ser Asp Thr Asp Gly Phe
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Met Glu Phe Leu Lys Tyr Ile Asn Ala Lys Leu Pro Gly Ala Leu Glu
565 570 575

Leu Glu Tyr Glu Gly Phe Tyr Lys Arg Gly Phe Phe Val Thr Lys Lys
580 585 590

Lys Tyr Ala Val Ile Asp Glu Glu Gly Lys Ile Thr Thr Arg Gly Leu
595 600 605

Glu Ile Val Arg Arg Asp Trp Ser Glu Ile Ala Lys Glu Thr Gln Ala
610 615 620

Arg Val Leu Glu Ala Leu Leu Lys Asp Gly Asp Val Glu Lys Ala Val

625 630 635 640

Arg Ile Val Lys Glu Val Thr Glu Lys Leu Ser Lys Tyr Glu Val Pro
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Pro Glu Lys Leu Val Ile His Glu Gln Ile Thr Arg Asp Leu Lys Asp
660 665 670

Tyr Lys Ala Thr Gly Pro His Val Ala Val Ala Lys Arg Leu Ala Ala
675 680 685

Arg Gly Val Lys Ile Arg Pro Gly Thr Val Ile Ser Tyr Ile Val Leu
690 695 700

Lys Gly Ser Gly Arg Ile Gly Asp Arg Ala Ile Pro Phe Asp Glu Phe
705 710 715 720

Asp Pro Thr Lys His Lys Tyr Asp Ala Glu Tyr Tyr Ile Glu Asn Gln
725 730 735

Val Leu Pro Ala Val Glu Arg Ile Leu Arg Ala Phe Gly Tyr Arg Lys
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Glu Asp Leu Arg Tyr Gln Lys Thr Arg Gln Val Gly Leu Ser Ala Trp
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Leu Lys Pro Lys Gly Thr
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<210> 15

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<210> 17

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<212> DNA

<213> Artificial Sequence

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<223> Description of Artificial Sequence:primer

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<210> 18

<211> 34

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<213> Artificial Sequence

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<213> Pyrococcus

<400> 29

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Ile Leu Ala Phe Asp Ile Glu Thr Leu Tyr His Glu Gly
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<210> 31

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<213> Thermococcus

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Leu Leu Ala Phe Asp Ile Glu Thr Phe Tyr His Glu Gly
1 5 10

<210> 32
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<400> 32

Arg Val Ala Ile Asp Ile Glu Val Tyr Thr Pro Val Lys
1 5 10

<210> 33
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Met Ile Val Ser Asp Ile Glu Ala Asn Ala Leu Leu Glu
1 5 10

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<213> T4 phage

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Val Ala Asn Cys Asp Ile Glu Val Thr Gly Asp Lys Phe
1 5 10